BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE APPLICATION NO. 2002-01

BP WEST COAST PRODUCTS, LLC

BP CHERRY POINT COGENERATION PROJECT

EXHIBIT 27.0 (MAK-T)

APPLICANT'S PREFILED DIRECT TESTIMONY

MICHAEL A. KYTE

Q. Please introduce yourself to the Council.

A. My name is Michael Kyte, and my business address is:

Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, Washington 98052

Q. What is the subject of your testimony?

A. My testimony will address two topics:

1. My background and experience related to marine biology.

2. Fisheries impacts of the proposed BP Cherry Point Cogeneration facility.

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Background

Q. What is your occupation and title?

A. I am a consulting marine and fisheries biologist with the title of "Senior Marine Biologist" at Golder Associates Inc. Golder Associates is one of the largest employee-owned engineering and environmental consulting companies in the world. Founded in 1960, Golder operates out of 84 offices throughout North America, South America, Europe, and Austral-Asia. Our more than 3,000 employees consult on ecological, environmental, engineering, civil and geotechnical projects. Golder clients are from the public and private sector, including government agencies, commercial and industrial companies, and natural resource industries.

Q. Please describe your education and experience.

A. My formal education following graduation from high school consisted of two years at the Everett Community College where my studies emphasized marine ecology and science. I transferred to the University of Washington in 1966. I graduated with a Bachelor of Science degree in Zoology with emphasis on chemistry, marine invertebrates, statistics, and oceanography in 1969. I entered the University of Maine in 1971 and received a Master of Science degree in Zoology in 1974. I have taken additional courses in geology and environmental toxicology to complement and supplement my degrees. In addition, I have received training for and am certified by the Washington Department of Fish and Wildlife for geoduck, submerged marine vegetation (eelgrass and macroalgae), and forage fish (herring, sand lance, and surf smelt) surveys.

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I have over 30 years of experience specializing in coldwater environments and habitats throughout the Pacific Northwest, Alaska, and New England. I have been employed in the private and public sectors as a private consultant and as a professional fisheries biologist. I have extensive knowledge of and experience with aquatic and marine intertidal and subtidal ecosystems, including contaminated sediment issues. My specialties include nearshore habitats; submerged marine vegetation; marine sampling methods and techniques; impact evaluation and mitigation; habitat and shellfish assessments; long-term ambient conditions monitoring; and contaminated sediment assessment. I have designed and conducted focused ambient marine monitoring programs in Northern Puget Sound designed to protect both the environment and industrial users. In addition, I have extensive experience with eelgrass as a critical habitat and am an expert in mapping, delineation, and mitigation measures.

My resume is attached as Exhibit 27.1 (MAK-1).

Q. Do you have any prior experience with the marine environment at Cherry Point?

A. Yes. My first experience with the Cherry Point marine environment was in 1967 when I assisted a University of Washington graduate student in the School of Engineering with a study on the impacts of wastewater discharge into the Georgia Strait from the Intalco Aluminum Smelter in Ferndale, Washington. In this work, I conducted intertidal and subtidal benthic sampling for infauna and Dungeness crabs and identified invertebrate species in sediment samples. I also assisted with bioassay

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tests of wastewater. Benthic sampling was conducted along the Cherry Point shoreline from Point Whitehorn to Neptune Beach.

In 1978, I documented baseline marine environment conditions for a proposed crude oil pipeline terminal at the Cherry Point Refinery (then owned by ARCO), including quantitative benthic sampling.

In 1982 through 1984, I assisted with a State Environmental Protection Act Environmental Impact Statement for a proposed graving dock construction facility at Gulf Road south of Cherry Point. I conducted special studies on use of the project site and vicinity by salmon, herring, and Dungeness crab.

In 1987, I began a long-term ambient marine conditions monitoring program for the Ferndale Refinery (then owned by BP). This program was expanded to include the Cherry Point Refinery. Marine environmental conditions were monitored using indicator organisms and communities, sediment chemical analysis, and regular aerial photogrammetry. This program was concluded in 1993. However, the aerial photography was continued with photographs taken every 4 years. Qualitative intertidal zone surveys (beach walks) from Point Whitehorn to Sandy Point were resumed in 1998.

Beginning in 1989, I conducted a 5 year study on the effects of dredging at the Ferndale Refinery Pier. This study emphasized impacts from dredging on flatfish and Dungeness crab populations including their benthic food sources. This study

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was expanded to include the Cherry Point Refinery marine terminal as a second study site. The study was completed in 1993.

In 1996, I assisted the Cherry Point Refinery with a proposal to expand its marine terminal to include an additional wing on the pier. In connection with this project, I supported a screening level ecological risk assessment through conducting a comprehensive literature search and review that resulted in a large annotated bibliography on the SE Georgia Strait marine environment including the effects of climate on herring and salmon. I have maintained and continually updated this bibliography through the present.

In 1999 and 2000, I compiled an Endangered Species Act Biological Assessment (BA) for the Cherry Point Refinery pier expansion. This BA received rapid concurrence from all agencies allowing the pier expansion to proceed on schedule.

Since 2000, I have conducted studies on wastewater discharges at the Ferndale Refinery and recharacterization of sediments in and around the wastewater dilution zone at the Cherry Point Refinery. In 2002, I and a colleague presented a paper on the status of marine habitats with emphasis on spawning conditions for Pacific Herring at the "Herring Summit and Pacific Coast Herring Workshop" held June 11 – 13, 2002, and sponsored by Washington Department of Fish and Wildlife and Washington Department of Ecology.

In addition to my consulting activities with Golder Associates, I am currently assisting a graduate student at Western Washington University with marine habitat

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studies on the Cherry Point shoreline. These studies are part of a regional ecological risk assessment that the Department of Environmental Toxicology at the University is conducting for the Washington Department of Natural Resources (WDNR). I am also providing technical expertise on the Cherry Point marine environment to the WDNR technical advisory committee for the establishment of an aquatic reserve in the area.

As a part of the long-term monitoring program described above and through the present, I have served as a liaison between the Cherry Point industries, two refineries and Alcoa-Intalco, and the state and federal agencies. I participate in each meeting of the Cherry Point Technical Work Group started in 1998 as a scientific representative of the industries. Through this activity, I am able to gather and provide technical information on the Cherry Point marine environment.

I attend meetings of relevant scientific conferences held by the Pacific Northwest chapters of the Society of Environmental Toxicology and Chemistry and the Estuarine Research Federation. I am an active member of these societies and use information obtained at their meetings and interactions with colleagues to better understand the ecosystem and environment in the Cherry Point and Puget Sound regions.

Q. What is your role in connection with the BP Cherry Point Cogeneration Project?

A. I was retained through Golder Associates to evaluate the effects of the Cogeneration Project on marine environments, and respond to questions about those issues. In

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addition, I am a member of the Golder Associates Inc. team for preparing the application to EFSEC for the Cogeneration Project ("Application"). I prepared the Endangered Species Act Biological Evaluation (ESA BE) (Appendix H) and assisted with the sections on Fisheries (Section 3.3).

Q. What information about the BP Cogeneration Project have you reviewed?

A. During the preparation of the ESA BE for the Cogeneration Project, I reviewed all aspects of potential environmental effects of the Project on the Cherry Point area. I especially studied the plans for waste and storm water management (Section 3.3 and Appendix F) and disposal and wetland mitigation. I discussed extensively the plans for wastewater management with Golder Associates engineers, especially Mr. Douglas Morell and Mr. Frank Shuri. The wetland mitigation plans were discussed with URS Corporation personnel, especially Mr. David Every.

In addition, I reviewed the sections on cooling water and the plans for recycling water from Alcoa-Intalco Works and discussed them with Golder Associates engineers and BP Refinery personnel including Mr. Mike Torpey and Mr. William (Bill) Martin.

I reviewed existing literature and interviewed appropriate representatives of the Washington Department of Fish and Wildlife and the Nooksack Salmon Association to obtain current information on freshwater and marine fisheries within the Cogeneration Project vicinity. Information on Nooksack River flows and fisheries was obtained for the Cogeneration Project and the earlier Refinery pier expansion project from U.S. Geological Survey Internet sites and the Lummi Nation. The ESA

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BA for the Refinery pier expansion and the comprehensive annotated bibliography on Cherry Point described earlier were particularly helpful in compiling the ESA BE for the Cogeneration project.

Biological Impacts

Q. What issues did you consider in evaluating whether the project would adversely affect marine/freshwater life?

A. I considered the following issues:

1. Whether wastewater discharge to the marine environment through the Cherry Point Refinery's outfall at the marine terminal would adversely impact marine life, including ESA listed species and their food sources (*e.g.*, Pacific herring) or the physical characteristics of the receiving water in the Strait of Georgia;
2. Whether stormwater discharged from the Cogeneration Project would adversely impact aquatic life and change physical characteristics (i.e., temperature and salinity) in freshwater and marine environments; and
3. Whether water withdrawals from the Nooksack River would adversely impact associated flora, fauna and fisheries, including ESA listed species (e.g., Chinook salmon and bull trout) and estuarine food sources for these species.

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Q. Let's take these one at a time. Will wastewater from the Cogeneration Project have any adverse effect on marine life, particularly Pacific herring and salmonoids, or the physical characteristics of the receiving water in the Strait of Georgia?

A. No. Industrial wastewater, which could carry trace oil or chemicals from the Cogeneration plant, will be routed to the Refinery and treated in the Refinery's wastewater treatment facility.[1] Net process wastewater from the Cogeneration plant to the Refinery wastewater treatment system will be 190 gallons per minute (gpm) (Application Table 3.3-4). The combined stream from the Cogeneration plant will have the estimated initial physical and chemical characteristics listed in Table 3.3-3 of the Application. This wastewater will be combined with the Refinery wastewater stream for treatment, and the final treated effluent will be discharged through the Refinery's NPDES-permitted offshore outfall at the BP marine terminal.

The Cogeneration wastewater component of the total Refinery's NPDES wastewater stream will be approximately 8.1 percent. Because the volume of Cogeneration wastewater is small and contains only low levels of contaminants, it will have little effect on the quality of water discharged.

Pursuant to Washington Department of Ecology requirements, the effluent from the Refinery outfall (including wastewater from the Cogeneration plant) must attain certain dilutions with certain specified radii known as a dilution or mixing zone. The purpose of the mixing zone is to prevent introduction above natural background

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[1] Sanitary wastewater will be routed to the Birch Bay Water and Sewer District (District) wastewater treatment plant for treatment and discharge.

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levels of toxic substances that have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the Washington Department of Ecology[2]. In other words, dilution zones are designed and permitted to prevent release of toxic substance in toxic amounts.

The Refinery's NPDES permit specifies the authorized chronic dilution zone to be an area extending 205 feet beyond each side of the diffuser centerline and 77 feet beyond each end of the diffuser. The boundary of the zone of initial dilution (ZID) or acute dilution zone is defined as 10 percent of the distance to the edge of the chronic dilution zone in any horizontal direction. Both dilution zones extend from the water surface to the seabed at 57 feet below mean lower low water (zero tide level).

According to modeling by Ecology, the Refinery effluent will be diluted within the ZID at a factor of 28:1. Outside the ZID, the effluent will be diluted at a factor of 157:1 before reaching the edge of the chronic dilution zone where all parameters must be equal to those of the ambient receiving water. There is no evidence that fish populations, including herring and salmonoids, are affected at these levels of dilution. Moreover, measurements in 1990[3] using dye injected into the refinery

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[2] Washington Administrative Code Chapter 173-201A-240

[3] ENSR Consulting and Engineering. 1991. NPDES Effluent and Water Quality Monitoring Study Dilution Ratio Study, ARCO Petroleum Products Cherry Point Refinery. Document number

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effluent showed that the actual dilution ratio within the ZID was 144 to 1 and the dilution at the edge of the chronic dilution zone was 1,709 to 1. There is no evidence to suggest that impacts to fish populations or food sources would occur at such levels. My studies and experience at Cherry Point have not disclosed any negative impact to fish or their food sources from the Refinery outfall. The addition of the wastewater effluent from the Cogeneration project should have no additional impact.

The fact that there is and will be no adverse impact to the marine environment is supported by toxicity testing by the Refinery. The Refinery's NPDES permit as issued by the Washington Department of Ecology under the direction of the U.S. Environmental Protection Agency requires acute, chronic, and whole effluent toxic (WET) testing. The refinery has for many years performed quarterly acute bioassay testing on the final effluent. The current NPDES permit requires acute bioassay testing at 100 percent effluent and at the "acute critical effluent concentration" (ACEC) (approximately 3.6 percent effluent). Compliance is required at the ACEC level. The ACEC is comparable to a "no observed effect concentration" (NOEC) commonly used in bioassay toxicity testing. The current NPDES permit also has a study condition for WET testing that required 4 quarters of chronic toxicity bioassay testing in each 5 – year NPDES permit period. This study was conducted in 2002 using the ACEC. The WET testing for the current permit period found no toxicity, and monitoring data going back four years shows the Refinery to be in compliance.

0480-086-200. Report prepared for ARCO Petroleum Products Cherry Point Refinery, January 1991.

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It should be noted that the objectives of the Refinery wastewater treatment plant are to float and remove oil, remove settleable solids, and to biologically oxidize hydrocarbons. Incidental to this process, trace metals are removed in varying degrees. The combined treated effluent from the Refinery and the Cogeneration facility discharged into the Straits of Georgia subject to the NPDES' permit's dilution factors may contain trace metals, but in levels below the State of Washington acute and chronic water quality standards. Previous studies[4] have shown that most trace metals are not detectable or are below established limits in marine waters offshore of the Refinery. Because of the natural dilution, dispersion, and recycling of trace elements in the Georgia Strait marine environment, the Refinery has had no measurable adverse impact on marine water quality during its 30 – year history. It is unlikely that the addition of wastewater from the Cogeneration plant, including trace metals, will have an adverse effect during its 30 – year projected life.

Q. Your answer focuses on quality of the wastewater. What about temperature – could the temperature of the wastewater have an adverse impact on the marine environment?

A. No. As described in Bill Martin's testimony, the Cogeneration project wastewater will not increase the temperature of the outflow to the Georgia Straits. However, even if it did increase the temperature of the outflow, it would not adversely impact the marine environment. The water into which the Refinery outfall is received is

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[4] Crecelius, E. 1998. Background metals concentration in selected Puget Sound marine receiving waters. Report prepared for the Western States Petroleum Association, February, 1998.

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subject to strong tidal currents flowing through and around the Refinery marine terminal. These currents flow at velocities of up to1 knot or more through the dilution zone causing vigorous mixing and dispersion of the wastewater. As a result, any increased temperature in the outfall is very rapidly reduced to ambient levels. In such conditions, it is unlikely that herring or salmon adults, juveniles, or larvae could be subjected to excess temperatures long enough to harm them -- even if they swam into or were carried through the dilution zone itself.

It is also noteworthy that State of Washington Administrative Code Chapter WAC 173-201A-400(8) (b) specifies that chronic aquatic life criteria and human health criteria must be met at the edge of the chronic zone. As discussed in a previous question, these criteria, including temperature, are established to prevent acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health. Modeling, periodic inspections, and measurements by the Washington Department of Ecology[5] confirm that the Refinery outfall meets these criteria at the edge of the chronic dilution zone and is well within the tolerances of marine fish.

Q. Did you also consider transboundary pollution impacts on marine life?

A. Yes. Discharges from the Cogeneration Project will not adversely affect marine life in the Georgia Strait, including migratory salmon moving from U.S. into B.C. waters. As discussed in a previous answer, wastewater from the Cogeneration plant

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[5] Washington Department of Ecology. 1998. Fact Sheet for NPDES Permit WA-002290-0 [ARCO Cherry Point Refinery]. November 24, 1998.

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will be extensively and thoroughly treated prior to discharge in the Refinery wastewater treatment system. The contaminants from the Cogen project that remain in the final effluent are too few and too rapidly diluted to adversely affect the marine environment.

In addition, as discussed in responses to previous questions, the discharge will comply with Washington's State Surface Water Criteria at the edge of the chronic dilution zone. This dilution zone is over 11 miles from the nearest point on the British Columbia – Washington border. This open marine water with its vigorous tidal and wind – driven currents would further dilute and mix any wastewater before reaching British Columbia. Furthermore, the project discharge is unlikely to flow toward British Columbia. A wastewater plume transport and fate study[6] conducted in 1999 to 2000 showed that distribution patterns for all constituents consistently indicate that water quality standards are not exceeded in the study area due to Cherry Point industries discharges. Plume components move in a consistent pattern southwards into the area between Cherry Point and the Alcoa – Intalco Works marine terminal. At no time does the plume show net movement to the northwest towards the British Columbia – Washington border. In addition, the net surface water movement as shown by satellite photos and studies of currents in the Strait of

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[6] ENSR Consulting and Engineering. 2001. Cherry Point Industries Effluent Plume Modeling Study. Final Report. Document Number: ARCO 0480-449-600.

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Georgia, especially during summer months, is south into U.S. waters[7]. This movement tends to bring water from the Fraser River into the Cherry Point vicinity.

Q. You also said you considered whether stormwater discharge from the project could impact aquatic life. Will that occur?

A. No. The proposed Cogeneration Project was designed to divert surface and storm water to prevent alteration of quality or quantity. First, surface and stormwater from unaffected areas around the Cogeneration plant site will be diverted to drain into a ditch leading to Terrell Creek. This will prevent alteration of the quality and quantity of surface water draining from or through the site to Terrell Creek. Second, no component of the proposed Cogeneration plant would be built near Terrell Creek and no storm or other surface water will be discharged directly or indirectly to it. Rather, stormwater from the Cogeneration project site will be routed through treatment facilities and detention ponds to the facility's wetland mitigation area. While hypothetically such stormwater could eventually seep into Terrell Creek under extraordinary high flow conditions, the distance to the stream and control measures before the water reaches the wetlands would prevent any effect on the stream. Third, where potentially contaminated stormwater is collected on the project site (very small amounts collected in secondary containment structures), it is diverted to the Refinery's wastewater treatment system with the Cogeneration facility's other wastewater. Stormwater discharge from the project will therefore not impact aquatic life.

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[7] Thomson, R.E. 1981. Oceanography of the British Columbia Coast. Canadian Special Publication of Fisheries and Aquatic Sciences 56: 291 p.

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Q. You also mentioned potential effects in the Nooksack River. Can you explain whether water withdrawn for the Cogeneration Project will have an adverse effect on fish in the Nooksack River?

A. Yes, I can explain. No, water withdrawals from the Nooksack River should not have an adverse effect on fish in the Nooksack River.

At this time, the PUD allocates approximately 4 million gallons per day (2,780 gallons per minute, gpm) to Alcoa for cooling purposes, out of a total operating demand of 7 mgd. Alcoa uses the cooling water for once-through cooling and discharges it into the SE Georgia Strait through Alcoa's NPDES-permitted marine outfall. The Cogeneration Project is working with the PUD and Alcoa to recycle this water and make it available for use cooling the Cogeneration plant and for use by other industrial customers of the PUD, including the Refinery. On average, this reuse would reduce the current need for withdrawals from the Nooksack River. Reduced water withdrawals should have no adverse impact on fish using the Nooksack River. Indeed, reduction of this withdrawal should provide more water. In the event that the Alcoa plant is closed, the Cogeneration plant would receive the water formerly allocated to Alcoa thus causing no or little change in the PUD Nooksack River water diversions, and no added impact to the aquatic environment.

The amount of water allocated and withdrawn from the river by the PUD for Alcoa's use is approximately 1.0 percent of the Nooksack River lowest monthly mean flow

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(629 ft³/sec).[8] It is unlikely that this amount of reduction would affect fish using the river since the Nooksack River varies daily by more than 10 times this amount. For instance, USGS flow records for August 6 to 7, 2003 show that the Nooksack River discharge at Ferndale varied 11.4 percent in a 24 hour period. A one percent variation appears to be insignificant when compared to the natural variation and likely would not cause adverse impacts to the river habitat.

Q. Did you consider the periodic increases in water withdrawals for the Cogeneration Project that may occur during very hot weather?

A. Yes. It is important to remember that this situation will happen very rarely, if ever. Overall, the project will reduce water withdrawals from the Nooksack River avoiding impacts to fish.

During exceptionally hot weather, the Cogeneration plant water requirements may increase from an average of 2,244 to 2,316 gpm up to 2,990 gpm (6.7 ft³/sec) (Appendix F, Table 5.2-1). In a "worst case" scenario, this increased flow demand may be made during a low river flow period. The lowest daily mean flow recorded by the USGS at Ferndale between 1966 and 2002 was 466 ft³/sec. A withdrawal for the Cogeneration plant in hot weather at this historic minimum level would withdraw a total of 1.4 percent, an increase of 0.4 percent over the normal withdrawal level, of the river's flow. Such a fluctuation is likely too minute to impact fish in the river.

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[8] Averaged over 35 years at Ferndale by the U.S. Geological Society (USGS) (http://wa.water.usgs.gov/realtime/waterdata.html).

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In reality, it is unlikely that a "hot weather" withdrawal would occur during the lowest flow period. The hottest weather in Blaine normally occurs in late July and early August,[9] while the lowest river flows occur in the fall or early winter; the previously cited lowest daily mean flow was recorded on November 9, 1987. However, even in the exceptional circumstance that these events did coincide, an increase of only 0.4 percent over the normal withdrawal would likely not impact fish in the river.

END OF TESTIMONY

[9] NOAA Western Region Climate Center: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wablai.

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